

CLAIMS

What is claimed is:

1. A method of removing technetium from a contaminated metal comprising:
providing a disc-shaped metal wafer as an anode in an electro-refining cell having a cathode and an anolyte solution; and
energizing the anode and cathode to dissolve the anode and deposit metal dissolved from the anode upon the cathode.
2. The method of claim 1 further comprising the operation of cutting one or more disc-shaped wafers from a contaminated metal ingot.
3. The method of claim 1 further comprising selectively preventing pertechnetate ions from collecting upon the cathode.
4. The method of claim 3 wherein pertechnetate ions are selectively prevented from collecting upon the cathode by cationic membrane filtering.
5. The method of claim 1 further comprising the operation of flowing said anolyte solution through a technetium trap outside of said electro-refining cell to remove pertechnetate ions from the anolyte solution.

6. The method of claim 5 wherein the anolyte solution is flowed through the technetium trap by a fluid pump.

7. The method of claim 5 further comprising the operation of flowing the anolyte solution through a particulate filter to remove particulate matter.

8. The method of claim 5 wherein the technetium trap comprises an electrolytic cell that collects technetium upon a second cathode.

9. The method of claim 1 wherein the metal comprises nickel.

10. A method of decontaminating a cylindrical metal ingot contaminated with technetium comprising:

cutting an ingot to provide one or more disc-shaped wafers;

providing one of said wafers as an anode in an electro-refining cell having an anolyte solution, and a cathode chamber containing a catholyte solution with a cathode disposed therein;

dissolving the anode within the anolyte solution; and

depositing metal dissolved from the anode upon the cathode.

11. The method of claim 10 further comprising the operation of filtering technetium from the anolyte solution.

12. The method of claim 11 wherein the operation of filtering technetium from the anolyte solution comprises flowing the anolyte solution outside of the electro-refining cell, through a technetium trap to remove pertechnetate ions from solution, and then returning the anolyte solution to the electro-refining cell.

13. The method of claim 11 wherein the operation of filtering technetium from the anolyte solution comprises filtering out pertechnetate ions through a cationic membrane.

14. The method of claim 10 wherein the cathode comprises a rectangular plate.

15. The method of claim 10 further comprising the operation of securing the wafer anode to a supporting header plate by welding.

16. The method of claim 10 wherein the operation of depositing metal dissolved from the anode further comprises transmitting metal ions through the catholyte solution to the cathode.

17. A method for removing technetium from nickel and other transition metals comprising:
providing substantially pure nickel in the form of a substantially cylindrical ingot;
cutting at least one disc-shaped wafer from the ingot;
providing said wafer as an anode in an electro-refining cell having a cathode and an anolyte solution;

dissolving the anode within the anolyte solution; and

depositing metal dissolved from the anode upon the cathode.

18. The method of claim 17 wherein the ingot is formed by molding and cooling of the ingot from the radial outer surface and progressing radially inwardly.

19. The method of claim 16 further comprising the operation of removing technetium from the anolyte solution by transmitting the anolyte solution through a technetium trap.

20. The method of claim 17 wherein the operation of depositing metal upon the cathode further comprises transmitting metal ions from the anolyte solution to a catholyte solution through a membrane.